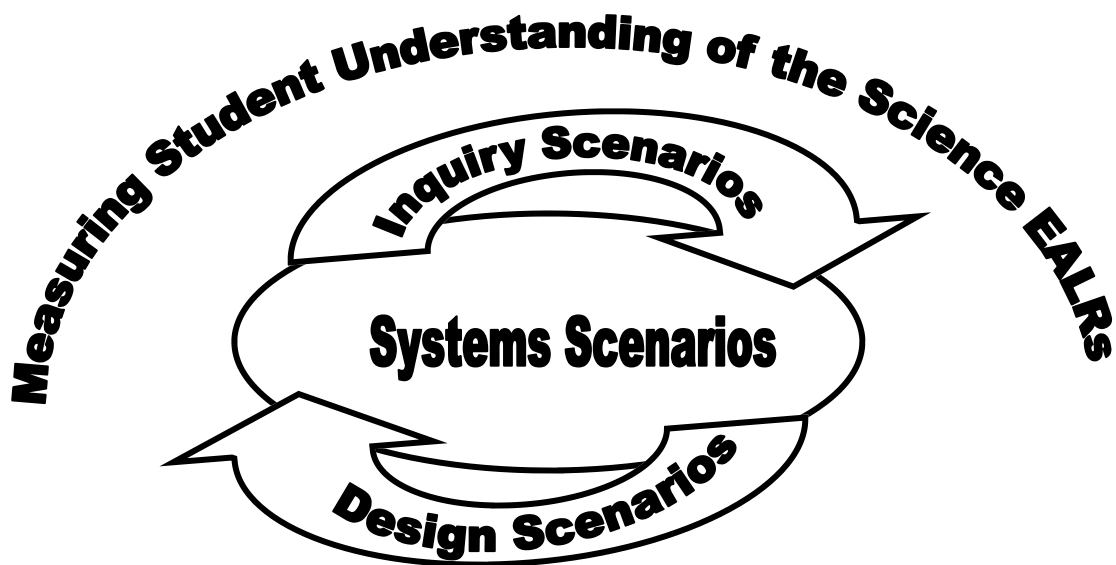


Powerful Classroom Assessment

Super Grow Fertilizer

Sample Grade 10 Inquiry Scenario



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario

Super Grow Fertilizer

For their science project, Elena and Glen decided to test the effectiveness of a new fertilizer, Super Grow. The manufacturer of the fertilizer claims Super Grow contains ammonium nitrate (NH_4NO_3) and will shorten the amount of time required to produce mature, pod-bearing plants from seeds (see Sample Pea Plant diagram). The manufacturer claims the plants treated with Super Grow will be mature in half the normal time and is environmentally safe.

Elena and Glen chose to test Super Grow on pea seeds. They performed the following investigation.

Question:

How will Super Grow affect the germination of pea seeds and the growth of pea plants?

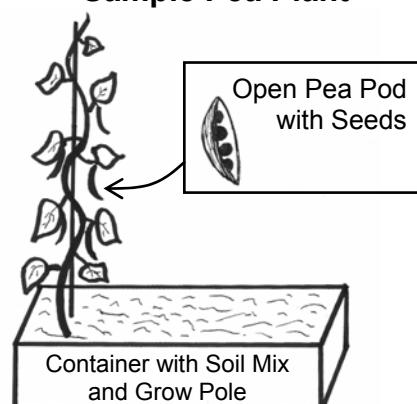
Hypothesis:

More pea seeds will germinate and the pea plants will grow faster with Super Grow because the seeds and plants will have extra mineral nutrients.

Materials:

two containers with grow poles labeled #1 and #2
pea seeds, all the same type
soil mix
Super Grow fertilizer
thermometer
water

Sample Pea Plant



Procedure:

1. Put equal amounts of soil mix in containers #1 and #2.
2. Add Super Grow fertilizer to the soil mix in container #2 in a concentration recommended by the manufacturer.
3. Plant 15 pea seeds in each container.
4. Water each container equally every day.
5. Be sure each container gets the same amount of light and stays at a temperature of 20°C .
6. Record the number of pea seeds that germinate.
7. Record the time (number of days) for the pea plants to mature.

Data:

Pea Seed and Pea Plant Data

Containers	Pea Seeds that Germinated (number)	Time for Pea Plants to Mature (days)
#1: soil only	14	70
#2: soil with Super Grow	13	45



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario Super Grow Fertilizer

Directions: Use the scenario to answer the following questions.

- 1** Which two variables were controlled (kept the same) in this investigation?
 - ☐ A. Amounts of soil mix and water
 - ☐ B. Amounts of Super Grow and light
 - ☐ C. Type of seeds and time for seeds to germinate
 - ☐ D. Time for plants to mature and growing temperature

- 2** Which variable was the manipulated (changed) variable in this investigation?
 - ☐ A. Temperature of the room
 - ☐ B. Time for plants to mature
 - ☐ C. Number of pea seeds used
 - ☐ D. Presence of Super Grow

- 3** Which variable was a responding (dependent) variable in this investigation?
 - ☐ A. Number of pea pods produced
 - ☐ B. Number of pea seeds germinated
 - ☐ C. Number of mature pea plants grown
 - ☐ D. Number of leaves on pea plants with pods



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario
Super Grow Fertilizer (continued)

4 Write a conclusion for this investigation.

In your conclusion, be sure to:

- Answer the investigative question.
- Include **supporting** data from the Pea Seed and Pea Plant Data table.
- Explain how these data **support** your conclusion.

Question: How will Super Grow affect the germination of pea seeds and the growth of pea plants?



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario
Super Grow Fertilizer (continued)

- 5** Is the investigation a fair test of their question?
- ☐ A. No, the investigation used only pea seeds.
 - ☐ B. Yes, because the data support the hypothesis.
 - ☐ C. Yes, the investigation included an experimental control condition.
 - ☐ D. No, because the same number of seedlings did not grow to mature, pod-bearing plants.
- 6** In the investigation, more seeds germinated in the container **not** treated with Super Grow. Does this mean that Super Grow is bad for plants?
- ☐ A. Yes, because one less seed germinated.
 - ☐ B. No, because a small experimental error is expected.
 - ☐ C. No, because Super Grow was tested by the manufacturer.
 - ☐ D. Yes, because all of the seeds in Super Grow did not germinate.
- 7** What is the source of **energy** for the pea plants to grow?
- ☐ A. Water
 - ☐ B. Light
 - ☐ C. Soil
 - ☐ D. Air



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario
Super Grow Fertilizer (continued)

- 8 As pea plants grow, the plants become more massive. Besides water, what is the **main** source of the mass of mature pea plants?
- ☐ A. Air
 - ☐ B. Soil
 - ☐ C. Nitrates
 - ☐ D. Sunlight
- 9 Why can pea plants grown from a pea seed be genetically a little different from the parent plants that produced the seed?
- ☐ A. The fertilizer could have caused the pea plant to grow with different genes.
 - ☐ B. The temperature and amount of water can mutate pea plants as they grow from seeds.
 - ☐ C. The recombination of genes during reproduction may result in variations in the offspring.
 - ☐ D. The manufacture may have caused a mutation in the seeds during cleaning and packaging.
- 10 Inside the cells of a pea plant are genes. What is the life function of these genes?
- ☐ A. Genes are responsible for cellular respiration.
 - ☐ B. Genes are energy-rich molecules used in cells as food.
 - ☐ C. Genes cover the cell controlling what can enter and leave.
 - ☐ D. Genes provide instructions for assembling protein molecules in cells.



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario
Super Grow Fertilizer (continued)

11 Explain why pea plants need water and soil to grow and be healthy.

Use words, labeled pictures, and/or labeled diagrams in your answer.

Why water?

Why soil?



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario

Super Grow Fertilizer (continued)

- 12** While doing their science project, Elena and Glen noticed that some plants grew tall but did not have a lot of healthy leaves. They wondered if the plants that had less space to grow still grew tall, but were not healthy. They developed a new investigative question, “How do different amounts of growing space affect the health of pea plants as measured by plant height and number of leaves?”

Plan an investigation that could answer their new question.

In your plan, be sure to include:

- Hypothesis
- Materials
- Procedure that includes:
 - logical steps to do the investigation
 - two controlled (kept the same) variables
 - one manipulated (changed) variable
 - one responding (dependent) variable
 - an experimental control condition (when appropriate)
 - how often measurements are taken and recorded

Question: How do different amounts of growing space affect the health of pea plants as measured by plant height and number of leaves?
Hypothesis:
Materials:



Powerful Classroom Assessment: Sample Grade 10 Inquiry Scenario

Super Grow Fertilizer (continued)

You may use the space below for a labeled diagram to support your procedure.

Procedure:

